



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/657,530

09/08/2003

Leland S. Swanson

TI-33235.1

9171

23494

7590

11/15/2004

TEXAS INSTRUMENTS INCORPORATED

P O BOX 655474, M/S 3999

DALLAS, TX 75265

EXAMINER

ANYA, IGWE U

ART UNIT

PAPER NUMBER

2825

DATE MAILED: 11/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/657,530

Applicant(s)

SWANSON ET AL.

Examiner

Igwe U. Anya

Art Unit

2825

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 August 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 33-40 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 40 is/are allowed.
- 6) ☒ Claim(s) 33, 34 and 36-39 is/are rejected.
- 7) ☒ Claim(s) 35 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 33, 34 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schuegraf (US Patent 6620732) in view of Vanhaelemeersch et al. (US Patent 6599814).

4. Schuegraf '732 teaches a bipolar transistor, comprising a collector region (402), a base region (420) overlying the collector region, an emitter-base dielectric stack comprising a carbide layer (444) sandwiched between oxide layers (442, 446) and having an opening exposing the base region (figs. 3A), and an emitter poly layer (430, 330) overlying the emitter-base dielectric and an exposed portion of the dielectric. The

Art Unit: 2825

first oxide contacting the base comprises silicon oxide, the carbide layer comprises silicon carbide (col. 5 lines 52 – 67), and the second oxide comprises a silicon oxy nitride (col. 6 lines 12 – 31).

5. Schuegraf '732 does not disclose an oxide layer resistive to a carbide dry etching process overlying the carbide layer.

6. However, Vanhaelemeersch et al. teach an oxide layer (34, 44, & col. 5 lines 38 – 51) resistive to a carbide dry etching process (col. 10 line 62 – col. 11 line 17) overlying a carbide layer (35, 45), and a base region (32, & col. 9 lines 64 – col. 10 line 3) underlying the carbide layer for a large process window (col. 11 lines 3 – 5).

Vanhaelemeersch et al., further disclose that silicon carbide underlying layer (43) can also be a stack of non-conductive barrier layer on a conductive layer (col. 10 lines 45 – 52), and a carbide layer of about 500 angstroms (col. 10 lines 38 – 41).

7. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Vanhaelemeersch et al. into the Schuegraf '732 references to achieve a large process window that is self aligned.

8. Claims 36, 38, and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schuegraf (US Patent 6620732) ^{in view of Vanhaelemeersch et al. and further} in view of Schuegraf (US Patent 6444535).

9. Schuegraf '732/ Vanhaelemeersch et al. reference teaches the features previously outlined, but lacks the thickness of the first oxide ranging from 70 – 100 angstroms, the first silicon oxide being a composite of a thermal silicon oxide 20 – 50

Art Unit: 2825

angstroms thick and a deposited silicon oxide of about 50 angstroms thereover, the silicon carbide having a thickness of about 100 angstroms, and the second oxide layer being silicon oxide of thickness 500 – 1000 angstroms.

10. However, Schuegraf '535 teaches a first silicon oxide of thickness 80 – 500 angstroms (col. 5 lines 47 – 57), and a silicon carbide of thickness 500 – 1000 angstroms (col. 5 line 58 – col. 6 line 2) for proper control of the emitter width.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of the Schuegraf '535 with the Schuegraf '732/ Vanhaelemeersch et al. reference for proper control of critical dimension. Where the general conditions of a claim are disclosed in prior art discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

11. Art made of record and not relied upon considered pertinent to applicant's disclosure include Chuang et al. (US 2003/0096486).

12. Claim 35 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

13. Claim 40 is allowable inter alia: a first oxide layer comprising a deposited silicon oxide layer overlying a thermal silicon oxide layer.

Remarks

14. The examiner has reviewed prior art in light of applicant's comments and amendment and finds it persuasive as to a first oxide layer comprising a deposited silicon oxide layer overlying a thermal silicon oxide layer. Applicant's argument

Art Unit: 2825

regarding an oxide layer resistive to a carbide dry etching process is unpersuasive, because etching selectivity is dependent upon the etchant chemistry relative to the etched substrates. Examiner also has discovered a new reference that teaches an oxide layer resistive to a carbide dry etching process. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Contact Information

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Igwe U. Anya whose telephone number is (571) 272-1887. The examiner can normally be reached on M - F 8:30am - 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew S. Smith can be reached on (571) 272-1907. The fax phone

Art Unit: 2825


number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Igwe U. Anya
Examiner
Art Unit 2825

IA

November 3, 2004


MATTHEW SMITH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600